

WHAT IS CLAIMED

1. An apparatus for detecting biofilm in the water conduits of a dental unit, especially biofilm adhering to the inside surfaces of the conduits; the dental unit being of the type at least comprising a water line equipped with a plurality of conduits that supply fluids to handpieces and fluid consuming units that use fluid from a main supply or accessory fluids from corresponding independent lines, wherein at least one portion of one of the conduits is equipped with means for detecting the presence of the biofilm at least on the surfaces of the conduit portion.
2. The apparatus according to claim 1, wherein the detecting means, at least in the conduit portion, are of the direct detection type that use an appropriate substance or fluid to cause an alteration in the biofilm.
3. The apparatus according to claim 1, wherein the detecting means, at least in the conduit portion, are of the direct detection type that use an

appropriate substance or fluid to color the biofilm.

4. The apparatus according to claim 1, wherein the detecting means, at least in the conduit portion, are of the direct detection type that use an appropriate substance or fluid to cause an alteration in the electrical parameters of the biofilm.
5. The apparatus according to claim 1, wherein the detecting means, at least in the conduit portion, are of the indirect detection type and comprise at least one sample element positioned inside the conduit portion and removable from the conduit portion itself; said sample element being contacted by the flow of fluid in the dental unit in such a way as to create the same operating conditions as those in the conduit portion, thus allowing the biofilm to adhere also to the sample element; there being a reagent or coloring fluid acting on the sample element.
6. The apparatus according to claims 2 and 3, wherein the detecting means comprise at least the conduit portion, which is transparent to allow a

direct visual check, and feed means for introducing a reagent or coloring fluid connected to, and acting on, the transparent conduit portion.

7. The apparatus according to claim 6, wherein the feed means comprise a tank containing the reagent or coloring fluid and means for pumping the fluid into the conduit portion through a first connecting channel leading into a first end of the transparent conduit portion.
8. The apparatus according to claim 7, wherein the other end of the conduit portion is connected to a second channel for draining out the mixture consisting of the reagent or coloring fluid and the fluid already present in the conduit portion.
9. The apparatus according to claim 6, wherein the feed means comprise a tank containing the reagent or coloring fluid and means for pumping the fluid into the conduit portion through a first connecting channel leading into a first end of the transparent conduit portion; the other end of the conduit portion being connected to a second channel connected directly to the tank and used

to recirculate the mixture consisting of the reagent or coloring fluid and the fluid present in the conduit portion.

10. The apparatus according to claims 1 to 3, wherein the detecting means comprise optical means located and operating at the transparent conduit portion and designed to emit a light beam before and after the reagent or coloring fluid is introduced so as to reveal a change in the color and/or transparency of the biofilm at least inside the conduit portion.
11. The apparatus according to claim 10, wherein the optical means emit a light beam whose wavelength is proportional to the coloring of the biofilm.
12. The apparatus according to claim 10, wherein the optical means comprise an emitter of the light beam positioned outside the conduit portion, and a control sensor positioned on the opposite side of the conduit portion and designed to receive the light beam and to check an absorption or transmission coefficient of the light passing through the conduit portion against a preset reference value defined before introducing the

reagent or coloring fluid into the conduit portion; alerting means being connected to the sensor and being activated by the sensor through a signal generated by the sensor when the value of the reading differs from the preset reference value.

13. The apparatus according to claims 1, 2 and 4, wherein the detecting means comprise means for detecting electrical parameters and in that the reagent substance is an electrolyte.
14. The apparatus according to claim 13, wherein the means for detecting electrical parameters comprise a conductivity sensor positioned inside at least one conduit portion and designed to detect the electrical resistance of the biofilm.
15. The apparatus according to claim 13, wherein the means for detecting electrical parameters comprise a conductivity sensor positioned inside at least one conduit portion and designed to detect the conductivity of the biofilm.
16. The apparatus according to claims 14 and 15, wherein the sensor is connected to a

corresponding control unit for reading, comparing and checking the electrical parameter detected; the control unit being in turn connected to alerting means activated by the control unit itself through a signal generated by the control unit when the value of the reading differs from the preset reference value.

17. The apparatus according to claims 12 and 16, wherein the alerting means consist of an audible warning device.
18. The apparatus according to claims 12 and 16, wherein the alerting means consist of a warning light device.
19. The apparatus according to claims 12 and 16, wherein the alerting means consist of an alphanumeric display unit to display the value of the reading.
20. The apparatus according to claims 12 and 16, wherein the alerting means consist of an alphanumeric display unit to display a reference message corresponding to the result of the reading.

21. The apparatus according to claim 6, wherein the transparent conduit portion is equipped with shutoff valve means located at the ends of it, designed to isolate the portion from the rest of the water line before the reagent or coloring fluid is introduced.
22. The apparatus according to any of the foregoing claims, wherein the conduit portion forms an extension of one of the conduits that supply the handpieces and is equipped with an independent drain.
23. The apparatus according to any of the foregoing claims, wherein the conduit portion is a part of a conduit that supplies one of the handpieces.
24. The apparatus according to claim 5, wherein the detecting means comprise a plurality of the sample elements consisting of a plurality of balls made of the same type of material as that of which the conduits of the water line are made.
25. The apparatus according to claims 5 and 24, wherein the sample elements are housed in a

container fitted inside the conduit portion in such a way as to permit the operating fluid to flow normally through the dental unit.

26. The apparatus according to claim 25, wherein the container is an integral part of the conduit portion.
27. The apparatus according to claim 25, wherein the container is of the disposable type.
28. The apparatus according to claim 25, wherein the container has a sealed access zone allowing it to be detachably coupled to a sampling cell from which the balls can be taken out one at a time and which is filled with a biofilm reagent or coloring fluid that causes the surface of the ball to change color perceptibly.
29. The apparatus according to claim 28, wherein the sampling cell is of the disposable type.
30. A method for detecting biofilm on surfaces in contact with the fluids inside the water line of a dental unit, the method comprising the following steps:

contacting the biofilm attached to the surfaces
with a reagent substance or fluid;

altering the biofilm by the reagent substance
or fluid;

detecting the alteration that has taken place
in the biofilm using the detecting means.

31. The method according to claim 30, wherein the reagent substance or fluid comprises a coloring agent.
32. The method according to claim 30, wherein the reagent substance or fluid comprises a coloring agent and the step of altering the biofilm is at least one change in the optical parameters of the biofilm.
33. The method according to claims 30 to 33, wherein the detecting step consists in observing the optical parameter which is visually perceptible.
34. The method according to claims 30 to 33, wherein the detecting step consists in measuring the optical parameter.

35. The method according to claims 31 to 34, wherein the optical parameter is at least the coloring of the biofilm.
36. The method according to claims 31 to 34, the optical parameter is the transparency of the biofilm.
37. The method according to claim 30, wherein the reagent substance or fluid is at least an electrolyte.
38. The method according to claim 30, wherein the reagent substance is at least an electrolyte and the step of altering the biofilm is at least one change in the electrical parameters of the biofilm.
39. The method according to claims 37 and 38, wherein the detecting step comprises a step of measuring electrical parameters.
40. The method according to claim 39, wherein the electrical parameters comprise at least one value of conductivity of the biofilm.

41. The method according to claim 39, wherein the electrical parameters comprise at least one value of resistance of the biofilm.

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